In the Claims:

1. (Currently Amended) A method of processing brain activity signals, the method comprising:

selecting an experimental process which elicits a response in one or more reward/aversion regions of a subject;

applying a reward/aversion stimulus to the subject to elicit the response;

noninvasively obtaining signals of central nervous system (CNS) activity from ~~a~~ the subject;

localizing signals to specific anatomical and functional CNS regions which participate in reward/aversion functions;

correlating the signals in the one or more reward/aversion brain regions to a type of pain; and

interpreting the correlation results as an indication of the type of pain in the subject, wherein correlating the signals from reward/aversion brain regions comprises evaluating the temporal nature of a neuroimaging signal using waveform based correlation analysis (WCA).

2. (Previously Presented) The method of Claim 1, wherein the reward/aversion regions include at least one of the subcortical gray, brainstem, cerebellum and frontal brain regions.

3. (Original) The method of Claim 2 wherein the brainstem region includes the spinal cord.

4. (Original) The method of Claim 1 wherein the spinal cord includes the trigeminal nucleus and the method further includes the step of non-invasively obtaining signals from the trigeminal nucleus.

5. (Previously Presented) The method of Claim 1 wherein the reward/aversion regions include at least one of the orbital gyrus (Gob), ventral tegmentum/periaqueductal gray (VT/PAG), nucleus accumbems (NAc), sublenticular extended amygdala (SLEA), cingulate gyrus, primary somatosensory cortex (S1), secondary somatosensory cortex (S2), thalamus, insula, cerebellum, prefrontal cortex, amygdala, hypothalamus, parahippocampal gyrus, hippocampus, entorrhinal cortex, ventral pallidum, dorsal striatum, primary motor cortices (M1), secondary motor cortices (M2), supplementary motor cortex (SMA), frontal eye field (FEF), rostral ventralmedial medulla (RVM), and brainstem subnucei.

6. (Original) The method of Claim 1, wherein obtaining signals of CNS activity includes using a neuroimaging device wherein the signals reflect at least one of functional activation, chemical signatures, brain structure, neurotransmission, electromagnetic activity, perfusion effects and cell metabolism.

7. (Currently Amended) The method of Claim 6, wherein the neuroimaging device corresponds to one or more of; a positron emission tomography (PET) device, a functional magnetic resonance imaging (fMRI) device, a magnetoencephalography (MEG) device, an electroencephalography (EEG) device, a single photon emission computer tomography (SPECT) device, an infrared (IR) device, a magnetic resonance spectroscopy (MRS) device, and a functional computerized tomography (CT) device.

8. (Original) The method of Claim 4, further comprising:

aligning an imaging axis of an imaging device with the spinal cord of a subject such that the imaging axis is aligned in a plane parallel to a spinal cord axis and perpendicular to a cerebral mid-plane; and

obtaining images of CNS regions in the spine.

9. (Previously Presented) The method of Claim 1, wherein non-invasively obtaining signals of central nervous system activity further comprises:

correcting the signals to reduce the effects of head motion;

transforming the signals into a uniform atomic space;

normalizing the transformed signals;

statistically mapping the normalized signal; and

locating the statistical maps over images reflecting at least one of: a uniform atomic space, an average anatomic space, and an individual atomic space.

10. (Previously Presented) The method of Claim 1, wherein non-invasively obtaining signals of central nervous system activity further comprises:

correcting the signals to reduce the effects of head motion;

aligning the signals with individual brain anatomy;

normalizing the transformed signals;

statistically mapping the normalized signal; and

locating the statistical maps over images reflecting at least one of; a uniform atomic space, an average anatomic space, and an individual atomic space.

11. (Cancelled).

12. (Currently Amended) The method of Claim [[11]] 1, wherein data obtained from central nervous system activity is segregated temporally.

13. (Original) The method of Claim 12 wherein data obtained from central nervous system activity is segregated temporally into a plurality of phases.

14. (Previously Presented) The method of Claim 12, wherein the step of temporally segregating includes the step of segregating into an early phase waveform and a late phase waveform.

15. (Original) The method of Claim 13, wherein interpreting the results of the correlating procedure further comprises correlating a plurality of pixels from regions in the CNS to distinct waveforms.

16. (Original) The method of Claim 15, wherein the distinct waveforms correspond to at least one of an early phase waveform and a late phase waveform.

17. (Original) The method of Claim 15, wherein interpreting the results of the correlating procedure further comprises producing indices by quantifying the signals using at least one of:

a spatial analysis;

a temporal analysis;

a comparison of slope analysis;

moment analysis;

laterality analysis;

synchrony analysis;

volume analysis;

power function used to generate indices;

power spectrum analysis used to generate indices;

integral analysis; and

derivative analysis.

18. (Currently Amended) The method of Claim 17, wherein interpreting the results of the correlating procedure further comprises using one or more quantitative indices wherein at least one of the one or more quantitative indices corresponds to one of:

a coordinate index from a uniform anatomic space;

a subregion index;

a subnuclear index;

a first time index T_p corresponding to a first moment of a signal response;

a second time index Δ corresponding to a second moment of a signal response;

a rate of signal change index;

an average time of response index;

a width of response index;

a tail index corresponding to a third moment of a signal response;

an R index;

an L index;

a fractional laterally index;

a correlation factor (r) index;

a volume index;

an exponent index;

[[an]] a power spectrum index representing amplitudes of signal response harmonics and subharmonics computed using a power spectrum analysis;

an index corresponding to one or more amplitudes changes computed using an integral analysis of a signal response;

an index corresponding to a maximum rate of change of a signal response computed using a derivative analysis of a signal response; and

an index corresponding to a time to achieve a maximum rate of change of a signal response computed using a derivative analysis of the signal response.

19. (Original) The method of Claim 1, further comprising:

providing a known first set of indices;

measuring one or more signal responses in a subject;

generating a second set of indices by computing one or more index for each of the one or more signal responses; and

comparing the second set of indices to the first set of indices.

20. (Original) The method of Claim 19 wherein:

the step of providing the known first set of indices, includes the step of providing the known first set of indices to a processor; and

the step of comparing the second set of indices to the first set of indices includes the steps of:

providing the second set of indices to the processor; and

comparing the second set of indices to the first set of indices using the processor.

21. (Original) The method of Claim 20 wherein the processor corresponds to a neural network processor.

22. (Cancelled)

23. (Currently Amended) A method of determining the effect of a compound on pain in a subject, the method comprising

~~The method of Claim 22 wherein the experimental process further comprises~~:

(a) administering to ~~the~~ a subject at least one of: a drug, a gene product, a biopharmaceutical, a virus, a gene, one or more receptors, and a neurochemical;

(b) applying a stimulus to the subject, wherein the stimulus elicits a response in one or more reward/aversion regions of the subject; and

(c) measuring a brain response of the subject, wherein the measuring comprises:

noninvasively obtaining signals of central nervous system (CNS) activity from the subject;

(d) localizing signals to specific anatomical and functional CNS regions which participate in reward/aversion functions; and

(e) correlating the signals in the reward/aversion brain region to a type of pain, thereby determining the effect of the compound on pain in the subject.

24. (Currently Amended) The method of Claim 23 further comprising measuring the response of the ~~same~~ subject over time.

25. (Currently Amended) The method of Claim 24 wherein measuring the response of the ~~same~~ subject over time comprises the steps of waiting a period of time and repeating steps (a) - (c).

26. (Currently Amended) The method of Claim 24 wherein measuring the response of the ~~same~~ subject over time comprises:

waiting a period of time;

administering a placebo to the subject;

applying a stimulus to the subject; and

measuring an analgesic response of the subject.

27. (Currently Amended) The method of Claim [[22]] 1, wherein the experimental process comprises:

exposing a subject to at least one of a thermal, mechanical or chemical stimulus; and measuring the response of the subject to the stimulus.

28. (Original) The method of Claim 1, further comprising:

administering a treatment to the subject; and

correlating the treatment to brain activity.

29. (Currently Amended) The method of Claim 28, wherein the treatment corresponds to at least one of a drug/gene product, a surgical treatment, a radiation treatment, a behavioral treatment, and an acupuncture treatment.

30. (Currently Amended) The method of Claim 1 wherein the step of interpreting the correlation result comprises:

correlating the signals from pain and reward brain regions; and

comparing results of the correlation to a predetermined index.

31. – 41. (Cancelled)

42. (Currently Amended) A method for evaluating the efficacy of a treatment for pain comprising:

non-invasively obtaining signals of activity from at least two different reward/aversion regions of the CNS;

~~quantitiating~~ quantifying the signals to generate a first pattern of activity;

administering a candidate treatment, excluding acupuncture;

non-invasively obtaining signals of activity from the ~~same~~ at least two different reward/aversion regions of the CNS;

~~quantitiating~~ quantifying the signals to generate a second pattern of activity;

obtaining physiological or psychophysical data from the subject; and

~~comparing~~ correlating the first and second patterns and the physiological or psychophysical data, thereby evaluating the efficacy of the treatment for pain.

43. (Currently Amended) The method of claim 42, wherein one of the reward/aversion regions is the NAc.

44. (Currently Amended) A method for evaluating the efficacy of a treatment for pain comprising:

non-invasively obtaining signals of activity from the nucleus accumbens (NAc);

~~quantitating~~ quantifying the signals to generate a first pattern of activity;

administering a candidate treatment, excluding acupuncture;

non-invasively obtaining signals of activity from the NAc;

~~quantitating~~ quantifying the signals to generate a second pattern of activity;

obtaining physiological or psychophysical data from the subject; and

~~comparing~~ correlating the first and second patterns and the physiological or psychophysical data, thereby evaluating the efficacy of the treatment for pain.